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ABSTRACT

A review of literature on the incidence and nature of injuries to young athletes is presented on the topics of: (1) physiological characteristics of preadolescents, adolescents, and young adults; (2) musculo-skeletal changes in the growing athlete; (3) epiphyseal injuries and their potential for resulting in temporary or permanent impairment; (4) special thermoregulatory/nutritional problems of young athletes; (5) psychological impact of early athletics; and (6) prevention of injuries and reduction of risk in sport activities. (JD)

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"Injuries to the Young Athlete"

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There are many things in our lives which change. But one truism continues unaltered and it concerns the love affair the young share with play. Adults may systematically ennumerate the physical, emotional, and social benefits one receives from regular recreational participation, but children, in their desire to be physically active and competitive, simply accept and embrace play for what it gives- basic personal enjoyment and gratification.

Authorities estimate that there are more than 20 million youths between the ages of 8 and 16 actively involved in community athletic/recreational activities each year. (17, 23) And this figure does not begin to take into account the myriad youth involved in spontaneous nonorganized/unsupervised activities of daily play. Little League, Pony League baseball, Pop Warner football, youth ice hockey, T-ball, club gymnastics, and tiny Tot swimming programs flourish nationally. They all provide children as young as five, with opportunities to become involved in organized athletics.

However of this 20 million, over ½ during sports-related activity, will sustain an injury which is serious enough to require professional medical attention. (12, 23) In fact, 50% of the male, and 25% of the female pediatric patients seen by most physicians this year will be victims of sports-related activities.

Critics of organized youth athletics point to this statistic and claim that it constitutes a new form of physical and psychological child abuse. Yet a review of the literature reveals that the injury rate of organized children's sports programs, (including football), is actually lower than many activities normally undertaken by children during random play, (i.e., skate boarding, roller skating, biking, etc.). (12,13,40,42)

Regardless of one's position concerning youth athletics, there are some valid questions which are being raised by researchers, educators, and parents.

1. Can children achieve a training effect?
2. Is training dangerous to the actively growing epiphyses?
3. Do preadolescents have special thermoregulatory/nutritional problems which must be considered?
4. Does growth/development benefit from training?
5. Are there safely established norms to which the preadolescent athlete may aspire?
6. What are the psychological effects of early sports participation?

We will address these questions today.

THE PREADOLESCENT/ADOLESCENT/YOUNG ADULT:

In order to understand the current data on youth and sports-related injury, it is important to define the population under discussion. Pappas utilized an examination of skeletal maturity as a method for denoting the child, (preadolescent), the adolescent, and the young adult. (23)

The long bones of a child are cartilaginous in nature. Childhood includes that period of time from birth until the appearance of all secondary centers of ossification, (epiphyseal plates or metaphyses) occurs within these bones. In the female, childhood terminates at 11 years of age and in the male, at 12.5 years.

The adolescent stage of growth begins with the appearance of the epiphyseal plates and terminates upon their complete ossification or fusion, (female: 14 years, Male: 17 years).

The young adult is characterized by completion of bony growth and the attainment of one's final muscular form, (females, 14± 3-5 years, males, 17± 3-5 years).

Today we will be considering injuries to the elementary/junior high school aged athlete.

Physically the human body is designed for action and no where is this more evident than in the preadolescent. (27) Sheehan has called the 11 year old one of the best endurance animals in the world. (30) Starek concurs, stating that cardiovascularly, the child is highly efficient. In fact, the ratio of cardiac output per unit of body weight reaches its maximum between the ages of 7-14 years and never again approaches this level in later life. (20)

Even at this early age, children are capable of achieving certain training effects from regular athletic participation.

Brown et al, in the examination of the effects of a 12 week cross-country program on preadolescent girls, noted a 26% improvement in VO2 max, (47 $ml \cdot kg^{-1} \cdot min^{-1}$ to the high 60's), and cardiovascular efficiency, (decrease in HR at submax levels). This training effect was carried over into adolescence as the subjects continued to run faster at they matured. (9)

Starek also noted the tremendous endurance potential of the pre-adolescent, stating that training may elicit an increase in cardio-vascular performance but the degree of improvement that will be achieved, will fall within each child's genetic limitations. (21, 35)

Improvements in cariac output, (increased stroke volume, decreased heart rate), blood volume, vagal tone, cardiac chamber hypertrophy, max $\dot{V}e$ capacity, and vital capacity are possible.

Barnes found that children in exercise test, are capable of responding predictably with increases in HR and $\dot{V}e$, but they do not achieve comparable lactic acid levels as seen in older subjects. (6)

However researchers noted that strength gains by the preadolescent athlete are some what limited due in great part to a lack of endo-

crine hormones, most notably, Androgens. (29) The "Trigger Point" hypothesis has been utilized by some authorities to explain that certain endocrine hormones are essential for the triggering of nitrogen and mineral retention utilized by the athlete for muscle hypertrophy. Since the child lacks this triggering mechanism, many authorities have suggested that preadolescent training be limited to skill development rather than physical weight training.

The controversy surrounding the efficacy of preadolescent weight training is one of avid contention. Most authorities suggest that if a weight training program is to be utilized at all, emphasis should be placed on correct lifting techniques and the use of a circuit training format where submax loads are lifted a limited amount of reps/sets.

So the preadolescent is indeed capable of achieving training effects. Large variations, (300-400% for ages 7-9), in measurable working capacities, have been noted by Bengtsson. (40) Increases in CO and VO2 max are common. (9,21,35) And while exercise has little effect on a child's final height and weight, (when compared to nonathletic children), there is a decrease in % body fat, and an increase in strength and flexibility in adolescents who have led an active and vigorous childhood. (6) Since both prepubescent girls and boys possess the same potential for vigorous activity, there is no need to adapt or separate PE classes/activites by sex. However, this physical equity is lost in post-pubescent athletes, necessitating a division of the sexes on the grounds of physical safety, in most collision sports. (29)

MUSCULO-SKELETAL CHANGES IN THE GROWING ATHLETE:

When one examines the advent of adolescence, significant changes

are noted within the musculo-skeletal system of the athlete. The major physical change presents as a rapid period of bony growth.

Bone may be viewed as both an organ and a tissue. As an organ system, bone serves myriad functions. It maintains skeletal integrity and provides protection for body organs. It acts as a lever system for muscle attachment, allowing movement to occur. It is one site of red blood cell production. And it serves as a storage area for calcium. As a tissue, bone matures by undergoing major remodeling and ossification. In the child, most bones of the body exist as cartilaginous precursors of their future bony forms. Initially the diaphysis, (shaft), undergoes a process of disintegration as cartilage is slowly replaced by compact bony matrix. The bony epiphyses also develope as secondary sites of ossification with spongy bone replacing the cartilage precursor. Only a small, yet actively cartilaginous growth plate continues to exist between the diaphysis and the epiphyses. This plate contains four layers of cells which are continually undergoing the slow process of remodeling.

The newest layer of bone lies between the diaphysis and the epiphyseal plate in an area known as the metaphysis. This new bone is thinner and less stress resistant to sheering, tensile, and compression forces than that found in the diaphysis. Until the remodeling process is complete and a sufficient calcium matrix is achieved by the new bone, the metaphysis remains the weakest link in the musculoskeletal chain and a site of potential injury in the young athlete.

A similar weak area of endochondral ossification occurs on the epiphysis of some bones at eminences, tubercles, etc. These sites called apophyses, serve as bony attachment sites for muscle tendons and ligaments. Like metaphyses, apophyses are, because of their weak bony matrix, susceptible to injury in the young athlete. (41)

EPIPHYSEAL INJURIES:

Are there unique hazards that may cause acute/chronic injuries in young athletes? Will these injuries result in immediate disability? A review of the literature reveals some interesting trends in youth sport injuries.

1. The adolescent growth spurt predisposes the athlete to a particular type of injury since the soft tissues, ligaments, and musculoskeletal units are unable to keep pace with the growth of bony elements. (12, 28) Ligaments at this time of life, are two to five times stronger than their bony attachments. (11) Therefore forces which normally result in strains/sprains in the adult may present as avulsion fractures of the metaphysis or apophysis in the adolescent. (22)

The potential for epiphyseal/apophyseal injuries reaches its peak in athletes 11-13 years of age. (41) The obese, Froelich type adolescent or the tall, lanky, uncoordinated youth with poor muscular development and lax ligaments are most susceptible to this type of injury. (32)

Osgood Schlatter, (2,8), Seivers disease, (achilles tendon/calcaneal apophysitis), Sinding-Larson Syndrome, (patellar tendonitis at the inferior pole), plus avulsion fractires of the ishial tuberosity, anterior superior/inferior iliac crest, greater/lesser trochanters, have been documented in this age group. (41)

Wilkins states that recent studies reveal the incidence of epiphyseal fractures is not greater in ordinary unsupervised play activities such as skate boarding, roller skating and biking than that level expected in Little League baseball, YMCA football or soccer, (10,28, 41).

Larson and McMahan reported that of 1,338 consecutive athletic related injuries sustained by children under 15 years of age, only 23 or 6% involved the epiphyseal plate. None of these 23 injuries resulted in permanent disability. (6, 17)

It seems then, that epiphyseal injuries possess a Jekyl and Hyde personality in that they do not necessarily result in crippling deformity or permanent disability. Depending on the age of the athlete and the site of the epiphyseal injury, this type of injury can either: 1.) help correct deformity by reshaping the bone as growth occurs, (Osgood Schlatters), or 2.) produce deformity by unequal bone growth after epiphyseal damage, (angulation deformity). (17,31) Therefore the real hazard with this type of injury, states Larson and McMahan, involves not recognizing the presence of an epiphyseal injury. Growth disturbance may occur but it is an exception and not the rule. (17)

2. Since bone adapts to the increased stresses of exercise by remodeling and increasing bony girth, researchers theorize that latent skeletal maiifestations may occur in response to early athletic activity. (23) Subluxation of the patella and associated chondromalacia patella, sports medicine oddities 30 years ago, are now the number one diagnosis for adolescent athletes seen in sports medicine clinic nationally. (9, 20,23) An increase in this type of injury may be due to three factors:

A. the weaker bone/cartilage common in adolescents;

B. the adolescent growth period which causes a muscular imbalance to occur within the quads. This results in lateral deviation of the patella;

C. and repeated microtrauma sustained during sports participation/training. (23)

In light of these findings, Micheli et al predict a possible future pidemic of chondromalacia and a corresponding shift in knee disease patterns in athletic populations over the next 30 years.

3. For those athletes sustaining serious knee injuries, studies by Brown et al., Huckell, Tapper and Hoover, and Medlar et al., reveal that menisectomy is not a benign procedure for the youth and results in long-term problems including the following: 1.) progressive joint instability, 2.) increase joint vunerability to further injury, 3.) the early onset of degenerative arthritis, and 4.) in many cases, a serverely symptomatic knee, (locking, giving way, repeated effusion). (15, 20, 37)

4.) Prolonged, intensive athletic training may have a potential long-term effect on the female endocrine system. A delay in the onset of menses and ammenorrhea have been reported in athletes who engage in heavy training schedules.
Ammenorrhea occurs when the athlete falls below a critical percentage of body fat. This problem is predictable in dancers, gymnasts, ice skaters, and endurance swimmers and runners of all ages. At present, the condition appears reversible as the athlete decreases the training load. However the latent effects that a delay in sexual matruation involves, are not yet fully known. (23)

Annorexia nervosa may also be a problem in some athletic activities and be precipitated by sports-related pressures as perceived by the athlete. (23)

5. The potential for overuse injuries occurs in many youth sports. Injuries such as Little Leaguer's elbow (24), tennis elbow (24), jumper's knee, chondromalacia (9), swimmer's shoulder (1,23), and

shin splints (9), are all examples of overuse injuries.
Usually these types of injuries are due to overtraining and/or improper technique. If ignored, or a training schedule is not modified, overuse injuries may progress to stress fractures, increased ligamentous laxity, or degenerative changes/fractures to articular surfaces of joints. (2)
And so as one can see, it is the onset of maturity/puberty which brings about significant improvements in strength, coordination, and athletic skills. But there is also a corresponding increase in the injury rate for the adolescent athlete due to several factors: 1.) an increase in body proportions and composition, 2.) an increase in generated force (29,37,41), 3.) a decrease in flexibility (1,20), and 4.) the possible predisposition for avulsion fractures/apophysitis due to the weak bony link at the musculoskeletal junction.
The size and exerted energy of athletic competitors are critical factors and directly influence the occurence/severity of injuries in contact/collision sports. (28) Studies concerning age group involvement in football, gymnastics, and skiing all agree that the severity and frequency of injury increases as the age, size, and skill level of the competitors increase. (12,28,32,37)
Therefore the preadolescent athlete, by nature of his/her inherent smaller size, ligament laxity, minimum muscular strength, a lack of desire/ability to hit opponents with forceful abandon, and his/her normal response to withdraw from a painful situation, is protected from many acute and chronic injuries which the older competitor sustains. (39)
Garrick and Requa (12), Silverstein (33), and Larson (16), all report that athletes under 10 years of age sustain the lowest rate of injury while the 11-14 age group is most at risk.

DO YOUNG ATHLETES HAVE SPECIAL THERMOREGULATORY/NUTRITIONAL PROBLEMS?

A review of the literature gives no clear cut answers to the former item. It seems that while the athlete is capable of acclimating to thermal stress, (in a time span similar to that of an adult: 80% in 3-5 days), (29), his/her ability to offset the environmental stresses, especially during endurance events, is a topic of debate. The American Academy of Pediatrics has expressed concern that the child athlete may be more susceptible to enviornmental stresses due to his/her inability to adequately acclimate. (5) The AAP has proposed the elimination of the preadolescent from participation in a full marathon due to this fact. (30)

Barnes, however, states that even though a child's sweating rate does not achieve its adult potential until 12-13 years of age, the young athlete is capable of achieving and maintaining an adequate level of thermoregulation. This is possible, Barnes states, since the body builds up heat in direct proportion to one's body weight. Heat is then dissipated in proportion to one's available surface area. The child athlete, states Barnes, possesses a better surface to weight ratio than his adult counterpart and is thus capable of sweating less yet remaining cool.(6)

Nutritionally speaking, the growing child, whether athlete or non-athlete, requires a well balanced daily intake of nourishment from the four major food groups. The only major nutritional danger the young athlete may face occurs when the child, parents, or coach purposely alter the diet in an attempt to achieve an "edge" over opponents. This practice is potentially dangerous since it may lead to such problems as vitamin/mineral deficiencies such as anemia, vitamin poisoning, and the formation of poor life-long eating habits which are based on fiction and myth and not a sound nutritional

basis. (6)

PSYCHOLOGICAL IMPACT OF EARLY ATHLETICS:

We live in a world which asks us to succeed and to continually prove ourselves. (23) Studies have shown that an individual's self-esteem is closely linked to one's performance levels at work and play. How do the psychological stress of early athletic participation effect a growing child's personality and behavior?

Psychological stresses that stem from sports are very real. They can in some cases, lead to physical injury, burn out, and can negatively affect one's attitudes towards sports in later life. (28) Smilkstein reported that the psychological trauma involved in not making an athletic team was perceived by some children/adolescents as being greater than the death of a grandparent, suspension from school, or the parent's loss of a job. (34)

There are many reasons why a child goes out for, and participates in sport: 1.) it is fun, 2.) his/her friends are also involved and each child strongly desires to identify with his/her peer group, 3.) it provides an avenue for learning self-discipline, team spirit, cooperation, self-confidence, and loyalty, and 4.) in some cases, it is expected. Often parent's esteem is tied to their children's athletic success. This usually occurs if the parents have lacked success in their own lives. Children of such parents are often under a great deal of psychological pressure to perform successfully. Yet they rarely quit athletics because they realize how important their participation is to their parents. (36)

Children who are inexperienced, lack inate athletic ability, or are late maturing, are often targets of constant criticism. They are made to feel that they are not living up to the expectations of

their peers, parents, or coaches. This pressure results in anxiety, which in turn reflects in the child's low self-esteem and lower athletic performance levels. It can also predispose the child to a greater risk of sports-related injury/illness. (23, 34)

Martins identified six main reasons why children quit sports participation. (18) They are:

1.) NOT GETTING TO PLAY: Ninety percent of those surveyed indicated that they would rather play on a losing team than ride the bench on a winning team.

2.) NEGATIVE REINFORCEMENT: Sometimes coaches forget that errors are a normal partessential part of the learning process. Some of your athletes will be quick learners but many will take more of your time and patience to coach. While negative reinforcement and criticism may initially motivate some athletes to try harder, continuous and prolonged constructive criticism soon turns kids off. No one likes to be made to feel inadequate. We all, regardless of age, need to be treated with dignity and to be recognized for our accomplishments no matter how small they may be or how infrequent they occur.

3.) MISMATCHING: From 10-16 years of age, the individual differences in physical structure can vary by as much as 60 months in children of the same chronological age. (18) This translates into a difference between some opponents by as much as 15 inches in height, and up to 90 pounds in weight. No child relishes the thought of being constantly beaten physically by an opponent who overshaddows him/her.

4.) PSYCHOLOGICAL STRESS:

When urealistically high goals and expectations are set, the young athlete is coerced to master physical skills too quickly and the child's natural enthusiasm for sport is lost. (5,18,26)

5.) FAILURE:

It may sound noble to say, "It matters not if you win or lose, it's how you play the game." It DOES too matter!! Unfortunately there must always be one winner and many "also rans" who often see themselves as "losers" (23) Constant failure or negative reinforcement creates anxiety which in turns decreases motivation, athletic performance levels, and the child's feelings of self-worth. (18)

6.) OVERORGANIZATION:

Most kids dislike highly regimented practices which tend to remove the element of fun from the sport. We must remeber that one major reason why children go out for sports is fun. (18) We must remember that the quality of adult supervision is of critical importance. The young athlete is strongly influenced by the role model the coach represents. How well this person leads will affect and mold the young athlete's character in many unforseen ways. (26, 28)

Parents need to realize how important their role is to the child athlete. The parents' response is critically important and influences how the child will handle success and failure in later life. Children need positive reinforcement. They need to be treated failly and know they have an equal shot at success. They need to develop a positive self-image. And they need to realize that they are still loved and are no less a person when they fail. (18,23) Athletics should allow the child to gain experience with both success and failure. How he/she learns to respond to both, will parallel his/her reactions to non-athletic trials as he/she matures.

PREVENTION:

Participation in sports- whether competitive or recreational, will always involve a certain degree of inherent risk. However the risk to the young athlete can be significantly reduced from present levels. There are tangible steps that we as parents, coaches, officials, and program supervisors can take to decrease this risk.

1.) Require all athletes to undergo a preseason physical examiniation which includes the completion of a comprehensive medical history. (29, 41) The purpose of such a screening is not to disqualify any child from a sport, but rather to correctly place the youth into a sport where he/she can safely participate within his/her given physical/emotional limits. (16) There may very well be an active place for the diabetic, asmhmatic, epileptic child in your sports program.

2.) Provide first rate, well fitted protective equipment for all participants and make use it is appropriately and consistantly used by the athlete. (1,8,26,29,36) Most children are disinterested or indifferent about the fitting, adjustment, and care of protective equipment. It then falls upon the coaches, parents, etc. to periodically inspect the equipment throughout the season and repair or replace it as needed. The best rule of thumb is, if it's broken, repair it. If it can't be repaired, replace it.

3.) Provide safe playing fields, courts, rinks. A pre-practice or pregame inspection of the playing surfaces should be undertaken to eliminate any unexpected dangers which may exist. (29,36,41)

4.) Provide a systematic and balanced program of athletic conditioning for the athlete. Such a program should emphasize endurance, flexibility, power, and strengthening exercises and be suited to the needs and abilities of the youth. (8,29,36,41)

Studies by Rosegrant, and Roser and Clawsen, state that the single

most important causitive factor in injuries to the young athlete is improper training/poor flexibility, and inadequate warm up/warm down. (4, 35) You, the coach, may have to be creative as well as enthusiastic in the way in which such a program is presented to a team since most young athletes are less than enthusiastic and motivated when it comes to the hard work required to condition the body to withstand the stresses of a sport. (1)

Roser and Clawson, in their study of the Seattle junior football league, noted that the first quarter of games is the most dangerous for young athletes. This high incidence of risk, they conclude, may be largely due to insufficient warm-up rather than fatigue since the intensity of hitting decreases as young athletes fatigue. (4)

5.) There are approximately 2,5 million adults presently active within the nation's youth sports programs. Most of these coaches are volunteers, well meaning, enthusiastic people, who for the most part are probably untrained in first aid skills, concepts of child growth and development, and formal sports skills teaching. (12) Unfortunately some adults, when they don a whistle, cap and a shirt with "coach" on it, suddenly forget that young athletes are kids-ordinary human beings who like themselves, still need praise, respect, and possess basic human rights. (12)

These coaches tend to treat kids as miniature adults. They schedule demanding practices, expect maximum effort at all times, and pressure the athletes with a "win at all cost" attitude. They forget that they are dealing with kids. In such coaches' opinions, children cease to be children when rthey play sports. They become "athletes" and as athletes, they must learn discipline, criticism, and intimidation. (12) This attitude from a coach can detrimentally affect the child's attitudes towards him/herself as well as his/her desire to

participate in sports in later life. (29)

The key to prevention of physical/emotional injury in part lies in responsible and reasonable coaching. These people need to be trained to recognize and attend to the physical and emoitonal fatigue/stresses common to young athletes. (29, 36, 41) Kids should not be expected to play with pain. Such "suck it up", spartan philosophies have no place in youth sports. (19) If there is any douot as to an athlete's fitness for play, he/she should not participate until he/she is seen by a medical professional. (8)

The two major reasons why a child participates in sports is because his/her friends are involved, and because it is fun. And if you take these two factors out of the child's sports, much of the value of physical activity and competition is lost.

6.) Preadolescent sports programs are usually modeled along rules, regulations, and procedures designed for adults/adolescents. These programs may not be appropriate for the child. (27) Organized sport programs therefore, should be adapted to fit the needs and abilities of the children they serve. (29) Modification of customs, rules, and conduct of the game will encourage all athletes to participate to the fullest extend of their physical/emotional capacities. (29) A shift in emphasis from competitive to life-time sports for the young athlete, (elementary level), may be indicated. (22) The child needs to be allowed to participate in sports for personal enjoyment without the fear of parental or peer rejection. (25) For the young child, a slow progression of skill technique is more important than striving for excellence. Physical activiites should allow the young athlete an opportunity to have fun, experiment with a variety of sports, while learning skills and achieving a reasonable degree of success. (26,27)

"...The intensity of competition should be low, increasing only as the children's skill level and interest increases. Competitive programs at these young ages should not be extensive that they demand all of a child's leisure time, denying him or her the opportunity to learn other sports and recreational skills in either organized or unorganized settings. ..." (12: 381)

Since growth rate and development vary vastly among young athletes of similar chronological age, care must be taken to match athletes according to weight, size, physical condition, and level of maturation. (27, 29, 36)

7.) And finally, there is a need to provide and empliment a comprehensive plan for the medical needs of the young athlete. (1, 36, 41)

A.) A written plan outlining the following items should be formulated:

1.) There should be access to an emergency phone and first aid supplies on site for each practice/game. Know whether the phone is "free" or a pay phone. If it is a pay phone, there should always be access to twice the amount of money necessary to make an emergency call,(This eliminates the chance of a misdialed number). A list of emergency phone numbers should also be posted in plain view at the phone, or the coach should be instructed where to find such numbers if a pay phone is used.

2.) A delineation of spheres of authority and responsibilities of all involved parties, (school/community administration, sponsors, coaches, athletes, parents, medical/paramedical personnel), should be drawn up. The person responsible for determining an athlete's ability to return to practice/participation should be chosen. Guidelines for the handling/disposition of injuries should be drawn up

and then religously followed. This is your liability protection.

3.) Medical care should be readily available at the site of participation/on call whether this is to be provided by a physcian, paramedic, EMT, trainer, or first aider.

4.) Mangement of all injuries should be made by qualified personnel and be based on a sound medical judgement.

5.) A program to certify coaches or supervisors in basic First Aid/CPR should be planned and completed prior to each season. A minimum of 16 hours training could very well mean the difference between a recovery or permanent disability/death to a young athlete, a member of your coaching staff, or a spectator.

6.) Work with parents, coaches, program supervisors and other community members to yearly up-grade the safety quality of your youth sports program.

In conclusion, early participation in athletics can contribute positively to the physical, emotional, and social development of the child. The child athlete is very capable of achieving a training effect cardiovascularly and can also grow in self-confidence and self-reliance if encouraged and not pressured to perform beyond his/her present capabilities.

The young athlete, (less than 10 years of age), by nature of his/her small size and strength, is generally at low risk in competitive athletics. However as the athlete approaches puberty, there is a parallel increase in both size, strength,and injury rate. This is due in part to the rapid growth period, and the associated weakness at the musculoskeletal junctions. Perhaps the knee is most subject to both acute and chronic stresses of sports. Chondromalacia is the most commonly reported injury for this age group. The 11-13 year old is most at risk for epiphyseal injuries however - only a small

percentage of all injuries to this age group involve the plate, (6%). (37,41) Overuse syndromes such as Little League elbow, shin splints, and swimmer's shoulder are also seen if training progresses too rapidly or at too intense a level.

Some degree of risk is inherent to athletic activity. However the injuries sustained in organinzed youth sports programs are fewer than those encountered during daily play. With proper planning, adapting sports to fit the needs/capabilities of the growing child, making available a wide variety of physical education activities to the child, utilizing competent supervisors/coaches, and formulating and emplimenting a written comprehensive plan to provide for the health care needs of the young athlete, the injury rate within organized youth sports programs will decline while the overall enjoyment of the child athlete will increase greatly.

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